

Patent Claims

1. A method for determining the three-dimensional position of vehicle passengers which comprises the following steps:
observing the vehicle passengers by means of at least two cameras (1, 2, 1', 2') which are disposed in such a way that they can operate in non-stereo mode;
extracting appropriate characteristics from the recorded video data of the vehicle passengers;
initializing a tracking method by means of a head model;
verifying the extracted characteristics by means of pattern recognition; and
tracking the verified characteristics by means of the head model.
2. The method as claimed in claim 1, wherein the characteristics are selected from a group which consists of facial or shape characteristics of the passengers.
3. The method as claimed in claim 2, wherein the facial or shape characteristics comprise eyes, nostrils, corners of the mouth, eyebrows or hairline.
4. The method as claimed in one or more of claims 1-3, wherein the cameras (1, 2, 1', 2') do not need to be synchronized.
5. The method as claimed in one or more of claims 1-4, wherein the cameras (1, 2, 1', 2'), having different fields of view, are positioned in such a manner that one eye of a driver (4) is always visible.

6. The method as claimed in one or more of claims 1-5, which furthermore comprises the step of determining the head attitude of passengers.

7. The method as claimed in one or more of claims 1-6, which also comprises the step of determining the direction of view of passengers.

8. The method as claimed in one or more of claims 1-7, which also comprises the step of determining the state of the eyelids of the passengers.

9. The method as claimed in one or more of claims 1-8, wherein the tracking step is based on the Kalman filtering of all recorded characteristics of the cameras (1, 2; 1', 2'), wherein the cameras can be operated asynchronously.

10. The method as claimed in one or more of claims 1-9, wherein the head model is an anthropometric model.

11. The method as claimed in one or more of claims 1-10, wherein the pattern recognition is a statistical pattern recognition.

12. A device for determining the three-dimensional position of vehicle passengers, comprising the following:
at least two cameras (1, 2, 1', 2') for observing the vehicle passengers, which are disposed in such a way that they can operate in non-stereo mode; and
a controller (3) comprising the following:
means for extracting appropriate characteristics from the recorded video data of the vehicle passengers;

means for initializing a tracking step by means of a head model;

means for verifying the extracted characteristics by means of pattern recognition; and

means for tracking the verified characteristics by means of the head model.

13. The device as claimed in claim 12, wherein the characteristics are selected from a group which consists of facial or shape characteristics of the passengers.

14. The device as claimed in claim 13, wherein the facial or shape characteristics comprise eyes, nostrils, corners of the mouth, eyebrows or hairline.

15. The device as claimed in one or more of claims 12-14, wherein the cameras (1, 2, 1', 2') do not need to be synchronized.

16. The device as claimed in one or more of claims 12-15, wherein the cameras (1, 2, 1', 2), having different fields of view, are positioned in such a manner that one eye of a driver (4) is always visible.

17. The device as claimed in one or more of claims 12-16, which also comprises means for determining the head attitude of passengers.

18. The device as claimed in one or more of claims 12-17, which also comprises means for determining the state of the eyelids of the passengers.

19. The device as claimed in one or more of claims 12-18, wherein the means for tracking are constructed for carrying out the Kalman filtering of all recorded characteristics of the cameras (1, 2; 1', 2'), wherein the cameras can be operated asynchronously.

20. The device as claimed in one or more of claims 12-19, wherein the cameras (1, 2) are arranged in the front area of the vehicle (10).

21. The device as claimed in one or more of claims 12-19, wherein one camera (1') is arranged in the front area and the other camera is arranged in the side area of the vehicle (10).

22. The device as claimed in one or more of claims 12-21, wherein the controller (3) also comprises means for controlling the release of an airbag and/or the adjustment of a head rest (5) and/or the adjustment of a seat of the vehicle by means of the detected head position.